Section I (Amendments to the Claims)

Please amend claims 37, 40, 41, 68, 70, and 71 as set out in the following listing of the claims of the application.

Please cancel claims 39 and 42, without prejudice.

1-36. (Cancelled)

37. (Currently amended) A sensor for measuring gas permeability of a test material, comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material, wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element, wherein the water and/or oxygen sensitive material is selected from the group consisting of metals of Group I of the periodic system of elements, metals of Group II of the periodic system of elements, iron, tin, chromium, conductive polymers, and mixtures and combinations thereof;

two electrodes electrically connected to the sensing element;

a base substrate that supports the sensing element; and

a liner layer interdisposed between the sensing element and the base substrate, wherein the liner layer comprises an organic polymer and/or an inorganic polymer.

38. (Previously presented) The sensor of Claim 37, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means.

39. (Cancelled)

40. (Currently amended) The sensor of Claim [[39]]37, wherein the ~~metal~~ water and/or oxygen sensitive material is selected from the group consisting of calcium and magnesium.

41. (Currently amended) The sensor of Claim [[39]]37, wherein the conductive ~~organic~~ polymer is selected from the group consisting of polyaniline, polypyrrole and polythiophene, polyacetylene, poly-p-phenylene, and polyvinylpyridine, thiophene-bipyridine copolymers, polypyridine, polybipyridine, and organometallic polyphenylenes.

42. (Cancelled)

43. (Previously presented) The sensor of Claim 37, wherein the electrodes comprise an electrically conductive material selected from the group consisting of a metal, metal oxide and mixtures and combinations thereof.

44. (Previously presented) The sensor of Claim 43, wherein the metal is selected from the group consisting of silver, gold, aluminium and copper.

45. (Previously presented) The sensor of Claim 43, wherein the metal oxide is selected from the group consisting of indium tin oxide, aluminium zinc oxide, and indium zinc oxide.

46. (Previously presented) The sensor of Claim 45, wherein the base substrate comprises a polymeric material.

47. (Previously presented) The sensor of Claim 46, wherein the polymeric material comprises an organic polymer selected from the group consisting of polycarbonate, polyethylene, polythersulfone, epoxy resins, polyethylene terephthalate, polystyrenes, polyurethanes and polyacrylates.

48. (Previously presented) The sensor of Claim 46, wherein the polymeric material comprises an inorganic polymer selected from the group consisting of silicones, polydimethylsiloxanes, biscyclopentadienyl iron, polydichlorophosphazene and derivatives thereof.

49. (Previously presented) The sensor of Claim 45, further comprising a barrier layer formed on the base substrate.

50. (Previously presented) The sensor of Claim 49, wherein the barrier layer comprises a material selected from the group consisting of metals, metal oxides, ceramic oxides, inorganic polymers, organic polymers and mixtures and combinations thereof.

51. (Previously presented) The sensor of Claim 37, wherein the electrodes are located on a surface of the substrate.

52. (Previously presented) The sensor of Claim 51, wherein the electrodes are spaced apart, thereby forming a trench.

53. (Previously presented) The sensor of Claim 52, wherein the sensing element is located in the trench.

54. (Previously presented) The sensor of Claim 37, further comprising an encapsulation enclosing the sensing element.

55. (Previously presented) The sensor of Claim 54, wherein the encapsulation comprises a polymeric material selected from the group consisting of epoxy polymers, polysulfide, silicone and polyurethane.

56. (Previously presented) The sensor of Claim 55, wherein the encapsulation provides a hollow space around the sensing element.

57. (Previously presented) The sensor of Claim 56, wherein the hollow space is filled with an inert gas.

58. (Previously presented) The sensor of Claim 54, further comprising a cover substrate, wherein the encapsulation is formed as side (lateral) walls surrounding the sensing element, and the cover substrate is arranged to be in contact with the side (lateral) walls.

59. (Previously presented) The sensor of Claim 58, wherein the cover substrate comprises a material selected from the group consisting of glass, aluminium and copper.

60. (Previously presented) The sensor of Claim 37, further comprising a protective layer covering at least a portion of the sensing element.

61. (Previously presented) The sensor of Claim 60, wherein the protective layer comprises a material selected from the group consisting of a metal, a metal alloy, a metal oxide, a metal oxide mixture, a metal fluoride and an organic polymer.

62. (Previously presented) The sensor of Claim 61, wherein the metal fluoride is selected from the group consisting of LiF and MgF_2.

63. (Cancelled)

64. (Previously Presented) The sensor of Claim 37, wherein the organic polymer is substantially permeable to gas.

65. (Previously Presented) The sensor of Claim 37, wherein the organic polymer is selected from the group consisting of acrylic polymers, and parylene type polymers.

66. (Cancelled)

67. (Previously Presented) The sensor of Claim 37, wherein the inorganic polymer comprises a silicone-based polymer.

68. (Currently amended) A method of producing a sensor for measuring gas permeability of a test material, said method comprising:

providing a base substrate that supports a sensing element and that further comprises a liner layer, wherein the liner layer comprises an organic polymer and/or an inorganic polymer;

depositing on the liner layer an electrically conducting sensing element that comprises a water and/or oxygen sensitive material selected from the group consisting of metals of Group I of the periodic system of elements, metals of Group II of the periodic system of elements, iron, tin, chromium, conductive polymers, and mixtures and combinations thereof, so that the liner layer is interdisposed between the base substrate and the sensing element;

providing two electrodes; and

connecting the electrically conductive sensing element to said pair of electrodes.

69. (Previously presented) The method of Claim 68, wherein the electrodes are deposited on a surface of the substrate.

70. (Currently amended) A system for measuring the gas permeability of a test material, said system comprising a sensor for detecting moisture permeation through the test material, said sensor comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material selected from the group consisting of metals of Group I of the periodic system of elements, metals of Group II of the periodic system of elements, iron, tin, chromium, conductive polymers, and mixtures and combinations thereof, wherein the reaction of said material with water or oxygen when the sensing element

is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element;

two electrodes electrically connected to the sensing element, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means;

a base substrate that supports the sensing element; and

a liner layer interdisposed between the sensing element and the base substrate, wherein the liner layer comprises an organic polymer and/or an inorganic polymer.

71. (Currently amended) A method of determining the gas permeability of a test material using a sensor for measuring gas permeability of the test material, said sensor comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material selected from the group consisting of metals of Group I of the periodic system of elements, metals of Group II of the periodic system of elements, iron, tin, chromium, conductive polymers, and mixtures and combinations thereof, wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element;

two electrodes electrically connected to the sensing element, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means;

a base substrate that supports the sensing element; and

a liner layer interdisposed between the sensing element and the base substrate, wherein the liner layer comprises an organic polymer and/or an inorganic polymer;

wherein said method comprises:

contacting the sensing element with water and/or oxygen;

measuring the changes in electrical conductivity of the sensing element over a period of time; and

calculating the gas permeability coefficient of the test material based on the measurements.

72. (Previously presented) The method of Claim 71, further comprising measuring the change in 1/f type noise spectrum density over the period of time.